Federal Information Systems Management

Issues and New Directions

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SOMETHING is seriously wrong with federal government computer operations. And given the size and complexity of federal information systems, solutions must be found before malfunctioning, error-prone and fraud-susceptible systems produce a managerial disaster of the first magnitude. The warning signs are unmistakable. Those who have studied the problems of the large and growing complex of federal systems have already compiled ample evidence that these systems constitute an accident—or more accurately, a whole series of accidents—waiting to happen.

What accounts for the present condition of federal computer management? How did things get this way? What are the issues that must be grappled with? And what seem to be the most promising approaches to improving things? These general questions are addressed in this paper, and remedies appropriate to the special needs of federal data processing managers are proposed.

Background

The purposes of this study were to identify the problems confronting information systems managers throughout the federal government, to analyze the adequacy of existing policies and proposals for improvement, and to suggest new policy solutions and managerial approaches. The study approach consisted of a review of earlier fact-finding and problem-solving efforts; an analysis of laws, regulations, policies, standards, and managerial practices; and discussions with policy officials as well as with knowledgeable outsiders who offered a government-

wide perspective. I have augmented the results of the research and interviews with my own judgments, gained through a quarter-century of experience as a computer professional and executive in both government and private industry.

During the interview phase, three general questions were posed to the persons identified in the appendix:

1. Do you agree that there is a serious problem with federal information systems management?
2. If you agree, what is the nature of the problem or problems?
3. What, in your view, should be done about these problems?

Early in the discussions, which were not structured beyond seeking a response to these questions, it became necessary to offer a working definition of "information systems management" as a common frame of reference, since everyone seemed to have his own notion of just what the term encompasses. For the purposes of this study, then, "information systems management" is broadly defined to include all the steps associated with the management of computer resources: policy setting, planning, the design and development of new applications, equipment acquisition and operation, and the maintenance of hardware and software. "Systems" are defined to include not only traditional "back office" data processing but also the newer technologies of data communications and office automation, along with still emerging computer-based problem-solving methodologies such as decision support systems.

The interviews revealed almost universal agreement that serious problems do exist and a fairly general consensus as to the nature of the issues. Most of the problems identified tallied with my own perspective on the issues; one notable exception was that the emphasis on personnel problems was greater than I had anticipated. There was, in fact, such consistency of viewpoint that a pattern emerged suggesting that several additional discussions I had originally planned would be only marginally productive.

When it came to ideas for improvement, however, opinions diverged sharply. These ideas ranged from better enforcement of rules to major changes in policy, and from more centralized management to a lessening of controls. Thus, while the issues identified in this paper represent general conclusions derived from the interviews, the proposals for improvement are largely mine.

Throughout this report, a top management rather than a technical

viewpoint is maintained, reflecting the basic study objective of discerning how future information resources can be applied more productively to support federal agency missions and goals. The policy roles of Congress and key central management agencies (the Office of Management and Budget and the General Services Administration) are focused on throughout because the actions of these organizations can enhance or impede the efforts of managers in the line agencies to exploit modern computer technology more effectively.

Case-by-case documentation of specific agency computer problems or individual system development failures is beyond the scope of this study, and it has already been done in numerous investigations by the General Accounting Office, the agency inspectors general, and congressional committee staffs. As an individual researcher working within a limited time period, I found it necessary to accept the judgments of others concerning particular agency problems.

When a preliminary version of this study appeared in *Government Executive* magazine in the February, March, and April, 1981 issues, feedback in the form of reader commentary was both interesting and useful. People in the program agencies for the most part were enthusiastic about the findings; those from agencies with oversight responsibility were lukewarm at best.

I found two commentaries of special interest. First, a staff member from the House Appropriations Committee suggested that by criticizing laws and regulations, I was in effect exonerating federal data processing management, the point being that even if the regulatory structure were to be streamlined or revamped entirely, instances of mismanagement would persist in various agencies. This is undeniably true, and I do not mean to imply that agency managers uniformly have excellent judgment and competence. Nor do I mean to suggest that there would not be significant managerial problems even if policy were improved. I have, however, deliberately chosen to concentrate on government-wide deficiencies amenable to improvement by actions that could be initiated by Congress or the oversight agencies. I believe these to be at the root of the problem.

A consultant to the Canadian government on data processing matters asserted that what I am really seeking is "deregulation" of data processing activities within the federal government, and he pointed out the irony of the U.S. government moving rapidly toward deregulation of industry in numerous areas while proceeding to build an additional

regulatory structure *inside* the government to control its computer managers. This insightful comment fairly summarizes the present situation.

Magnitude of the Problem

Information systems technology has become so embedded in the management structure of the federal establishment that vital administrative, scientific, and military functions are now almost totally dependent on the smooth functioning of computer hardware and software. With an installed base of over 15,000 computers and a work force of more than 100,000 computer specialists, federal systems operations dwarf those of even the largest users in the private sector. Applications range from massive transaction-processing activities in agencies like the Internal Revenue Service and Social Security Administration to military command and control systems and sophisticated research projects in fields like medicine and space technology.

With this size and diversity have come enormous problems that defy easy solution. Despite a clear consensus that problems do exist, confusion and disagreement follow any attempt to find the best means of improvement. There is even confusion about just how many computers are involved and how much they are costing. In hearings held in June 1976 the House Government Operations Committee was able only to estimate that federal spending for data processing ranged between $3 billion and $15 billion annually.[1] In 1980 the Office of Management and Budget (OMB) cited a figure of $5.5 billion, and the General Services Administration (GSA) estimated the cost of software development and maintenance alone at $2.2 billion.[2] But regardless of the numbers involved, it is unquestionable that federal computing is big business.

1. *Review of Administration of Public Law 89-306, Procurement of ADP Resources by the Federal Government*, Hearings before a subcommittee of the House Committee on Government Operations, 94 Cong. 2 sess. (Government Printing Office, 1976), p. 2. The committee noted that if the $15 billion figure were correct, it would represent 4 percent of the entire federal budget.

2. Figures cited in a presentation by Bernard Bennington, director of the Office of Software Development, GSA, to the Interagency Committee on Automatic Data Processing, "Summary of Meeting" (IAC/ADP, November 12, 1980), p. 6.

In the earliest days of data processing the federal government was a leader and an innovator in computer usage. In fact, computer technology itself was incubated through government support of World War II research efforts that produced prototypical stored program computers such as the ENIAC. The first successful large-scale data processing installation was made in the early fifties at the Census Bureau, and the initial impetus toward programming languages for business applications came from Department of Defense support of the COBOL programming language in the sixties.

But somewhere along the line, as the United States entered the seventies, the situation grew worse, and now a large portion of the federal government's equipment is generally acknowledged to be obsolescent, lagging seriously behind comparable installations in private industry. In a 1980 study of computer obsolescence, the General Accounting Office analyzed 1,366 medium- and large-scale computers in the federal inventory and found that, on the average, they had been acquired seven years earlier. Even worse, the GAO found that the technology of 978 of these processors, from four major manufacturers, was about twelve years old.[3]

The age of these 978 computers, based on year acquired, is as follows:

Time of acquisition	*Number of computers*
Pre-1963	34
1963–66	112
1967–70	253
1971–74	332
1975–78	245
April 1979	2
Total	978

3. U.S. General Accounting Office, *Continued Use of Costly, Outmoded Computers in Federal Agencies Can Be Avoided*, AFMD-81-9 (GAO, December 15, 1980), pp. 5–7. The obsolescence doubtless reflects the tendency of suppliers to bid systems that are at or near the end of their product life cycle and hence can be unloaded at cut rates by submitting the lowest-cost bid in competitive procurements that take into account only raw hardware costs. The GAO report goes on to point out that obsolescent computers are more expensive to operate and possess serious technological deficiencies such as limited input-output capability, restricted memory capacity, and outdated system software.

Their age, according to the time each model was first available, is:

Year model was first available	*Number of computers*
Pre-1963	108
1963–66	478
1967–70	39
1971–74	308
1975–78	45
Total	978

Considering the continuing dramatic improvements in computer technology, the government's aging equipment has to be a matter of concern to those seeking to gain the benefits in productivity and heightened managerial control available through today's more cost-effective hardware and software.

The overall situation has perhaps been summarized best in the report of the federal data processing reorganization study initiated by the Carter administration and known popularly as the President's Reorganization Project:

> The federal government is, in general, mismanaging its information technology resources and has not developed a plan for exploiting the opportunities of the future with respect to investment, service delivery, protection of citizens or national security. This condition is manifested by such major symptoms as:
> —Public complaints about delays and inaccuracies at many service delivery points.
> —An inability to protect the rights and privacy of individuals from intrusive practices of government agencies and others.
> —Growing obsolescence of equipment, systems and personnel.
> —Increasing economic threats which have been accelerated by the availability of technical information and products flowing freely and uncontrolled from the United States into competitor nations.
> —A military enterprise which is operationally vulnerable as a consequence of obsolescent equipment and systems and underdeveloped technical personnel.[4]

The findings of this massive study, which involved ten task forces and more than fifty government and private sector computer experts, were perhaps more compelling than the solutions proposed. In any case, the final report, completed in April 1979 and containing many recommendations for improvement, was never forwarded by the OMB to the president as an official agenda for action, despite repeated urgings by the task force leaders.

4. President's Reorganization Project, Federal Data Processing Reorganization Study, "Summary Report," April 1979, p. 2.

Though the President's Reorganization Project has been the most extensive study undertaken, it is by no means the only one. In 1976 the Interagency Committee on Automatic Data Processing, an organization of senior federal data processing managers, sponsored a two-day problem-solving conference at Airlie House, which I chaired. This meeting produced forty-two specific recommendations in six major categories: data processing management, executive-legislative relationships, management information systems, personnel management, public–private sector relationships, and data processing resource sharing.[5] In reviewing the fate of these recommendations at a subsequent meeting in 1978, I reported that only two had been implemented entirely and only four in part, with no action taken on the remaining thirty-six.[6]

The GAO makes frequent studies of various aspects of federal computer usage. A few report titles convey the flavor of the findings: "VA Must Strengthen Management of ADP Resources to Serve Veterans' Needs"; "The Worldwide Military Command and Control System—Major Changes needed in its Automated Data Processing Management and Direction"; and "The Navy's Computerized Pay System is Unreliable and Inefficient—What Went Wrong?"[7]

Besides these official studies, articles abound in the computer trade press and the general press regarding malfunctions in critical government computer systems, serious cost overruns in large system-development projects, and the inability of computer processing to support new government programs. For example, an editorial in *Computerworld*, a leading trade weekly, asserted that "the recent malfunction of a U.S. Air Force computer system, which mistakenly alerted the Strategic Air Command (SAC) to a nonexistent Soviet military attack, raises serious questions about the plight of the nation's military computing operations."[8] The Associated Press, in reporting pending changes

5. Interagency Committee on Automatic Data Processing, *Proceedings of the Interagency Automated Data Processing Planning Conference, February 22 through 24, 1976* (General Services Administration, Automated Data and Telecommunications Service, May 1976).

6. Interagency Committee on Automatic Data Processing, *Management Conference Proceedings, April 16–18, 1978* (GSA, ADTS, 1978), pp. C1–C5.

7. These and numerous other GAO reports on automatic data processing can be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. The "Monthly List of GAO Reports" is available from the GAO Document Handling and Information Services Facility, P.O. Box 6015, Gaithersburg, Maryland 20760.

8. "Problems with Norad," *Computerworld*, June 23, 1980, p. 24.

in social security coverage, quoted Social Security Administration officials as saying that "it will take . . . 9,000 worker-years and cost $170 million to find and recompute the minimum benefits," and that "any major systems failure could put us in a hole that will require years to overcome."[9] Social Security Administrator John A. Svahn is quoted as acknowledging that his major computers were "near collapse."

Some Popular Nostrums

Despite the critical nature of the President's Reorganization Project and other studies, there have been few indications of improvement. A handful of proposals, such as that in the project report to increase the authority of agencies to procure computers without GSA approval, have been implemented.[10] But most proposals, especially the more sweeping and basic ones, have not found ready acceptance. In some respects this may be just as well since some of the remedies proposed appear to be potentially ineffective and in some instances even counterproductive. Below, the various suggestions for improvement are categorized broadly with comments on the potential efficacy of each.

Emulate private industry. Granting that government data processing managers have fallen behind their private sector counterparts in both system development and computer operations, does it not follow that the government should more closely pursue the approaches that are working in private business? This notion seems especially alluring when it is noted that many government systems are very comparable in function to those in industry. After all, payroll accounting *is* payroll accounting and accounts payable are accounts payable. Or so the argument goes.

Consider this quotation from a speech to a government group by an advocate of this point of view: "Once we [at Southern Railway] decided on Data General as a supplier of minicomputers, I decided any mini

9. Christopher Connell, "Chaos Feared if Minimum Benefits Cut," Associated Press, July 1, 1981.

10. The GSA has moved gradually in recent years to give agencies more latitude in procuring computer equipment and services. In 1978 the threshold for hardware was raised from $50,000 to $300,000 and in 1981, from $300,000 to $500,000. The authority of agencies to procure software and services on their own has been raised from $10,000 to $100,000.

was great as long as it was from Data General. In the government, such practice is a 'no-no' known as 'sole sourcing.' Unlike you, I am not measured on how fair and honest I am [to the suppliers] but on how effective I am."[11] What this line of thinking implies, of course, is that it might be desirable to relax the rules—in this instance the rules calling for competitive procurements—in the interest of enhanced managerial effectiveness. To the degree that procedures calling for competitive bids result in delays and extra paperwork, it is said, the procedures should be scrapped or streamlined. And if this is good for hardware acquisitions, then presumably the same should be done with civil service personnel practices that impede the hiring and retention of qualified computer technicians and managers.

It is obviously unrealistic to expect radical change along these lines. More important, the elimination of the basic ground rules in such areas as procurement and personnel is not a good idea anyway. These laws and regulations were devised for basically estimable purposes: for example, to assure equitable treatment of vendors bidding on government business and to apply merit system principles to people in government. A powerful case would have to be developed to justify exempting data processing equipment and personnel and managerial practices from government-wide ground rules.

But apart from both the practical difficulties and the equities involved, there *are* intrinsic differences between government computer operations and those in the private sector that make the remedy of private sector emulation suspect. One is reminded of Professor Henry Higgins's plaintive query in *My Fair Lady*, "Why can't a woman be more like a man?" There are compelling reasons why the government cannot cure its data processing ailments by behaving more like the private sector, and I will consider these in more detail shortly.

Enforce the rules. Another viewpoint with many adherents among those seeking to reform federal data processing operations is that the principal problem is lax enforcement by the central management agencies of laws and procedures covering key matters like procurement. The inaction and ineptitude of central agency officials, it is argued, permit the rules to be bypassed by systems people in the user agencies.

11. Remarks by John L. Jones, vice-president of Management Information Services for Southern Railway, at the 1979 Federal Computer Conference, Washington, D.C., October 1979.

This view is especially prevalent among reporters and commentators in the computer trade press who seize upon the instances of favoritism in hardware and software contracting that occur all too frequently throughout the federal establishment. This viewpoint in the past has also been expressed by officialdom, most notably the House Government Operations Committee, which has consistently sought stronger enforcement of legislation on the books, in particular Public Law 89-306, an amendment to the Federal Property and Administrative Services Act of 1949 popularly known as the Brooks Act of 1965, after its sponsor, Congressman Jack Brooks of Texas. This act spells out the data processing management responsibilities of the OMB, GSA, and National Bureau of Standards (NBS). Committee hearings in 1976 produced a scathing indictment of both the central management agencies and the user community. The general tenor of these hearings is encapsulated in the committee's summary report, which declared:

—GSA has repeatedly authorized noncompetitive procurements which were not adequately justified.
—GSA has failed to enforce regulations and restrictions in [the automatic data processing] procurement authority delegated user agencies.
—GSA has not provided adequate management guidance to user agencies.
—OMB has failed to establish concise, clearcut policy.
—NBS has failed to provide necessary hardware and software standards.
—Federal user agencies have consistently failed to cooperate with GSA.
—Federal user agencies have shown a general reluctance to adhere to the purpose and intent of the Brooks Act.[12]

The report concluded that sole sourcing was rampant; only 36 percent of the cases studied by the committee in fiscal year 1975 revealed "fully competitive" procurements.[13]

A corollary to the enforce-the-rules school of management improvement espouses what might be termed a "devil theory" to help explain the present state of things. According to this hypothesis, certain agencies can be identified that have had an especially shabby history of noncompliance with the rules. And indeed this "rogue agency" theory does appear to have some validity when one looks at the procurement patterns in some organizations. There *does* seem to be a tendency in certain agencies to rely unduly on sole-source acquisitions.

Of course, from the agency's standpoint there may be valid reasons

12. *Administration of Public Law 89-306, Procurement of ADP Resources by the Federal Government*, H. Rept. 94-1746, 94 Cong. 2 sess. (GPO, 1976), p. 3.
13. Ibid., p. 4.

to justify a noncompetitive award to an entrenched computer vendor. And this is permissible under certain exceptional circumstances, such as the contingencies of national defense requirements or the necessity to meet urgent schedule commitments. Critics maintain, though, that these special circumstances are not genuine in many cases and that the rules are bent to permit agencies to follow the line of least resistance.

A key problem in better enforcement of the rules has to do with their interpretation. For example, the emergence of "plug compatible" computer manufacturers, such as Amdahl and Control Data Corporation, raises troublesome questions about just what is and what is not a sole-source procurement these days. In the past a "name brand or equal" computer procurement was usually a code phrase to justify adding more IBM product line equipment by specifying performance features unique to IBM. Bids would then be forthcoming only from IBM or perhaps from a "third party" leasing firm in the business of buying IBM hardware and leasing it to government agencies. Nowadays, however, specifying IBM equipment as the brand name or equal can result in genuine competition. Amdahl and several others offer gear that is compatible in its features to that of IBM, and it often has a more attractive cost-performance ratio.[14]

Another problem in interpreting the rules lies in the treatment of software conversion costs. Most large government agencies, like most big industrial firms, have built up a huge portfolio of operational computer applications running on existing computers. In such circumstances, shifting to a different brand of equipment that is incompatible with that already installed can lead to costly and time-consuming software conversions. This has prompted some concerned officials to argue for including conversion costs in the cost analysis for replacement of equipment even though this may favor the entrenched supplier, who

14. In its report on obsolescence, the GAO urged the adoption of an "expeditious competitive acquisition" strategy that among other things would "require that replacements to systems be capable of using existing software, including, where possible, plug compatible or emulation processors" (*Continued Use of Costly, Outmoded Computers . . . Can Be Avoided*, p. 30). The GSA, in its comments on the report, spurned the suggestion that it issue guidelines supporting the replacement of outmoded computers with newer program-compatible equipment, asserting that "these guidelines are not necessary. There is no requirement today that agencies keep obsolete equipment" (ibid., p. 60). But the GAO argues convincingly that "the current acquisition cycle is long, complicated and frustrating. Some major [automatic data processing] procurements take six years or longer to complete" (ibid., p. 28).

can offer computers more powerful than those already installed and able to process existing programs without the need for software conversion.

The House Appropriations Committee has advocated an approach called lowest total overall cost, which takes into account conversion cost factors rather than simply comparing the costs of new hardware alone. The House Government Operations Committee, however, has taken the position that the loading in of conversion costs orients the procurement in favor of the existing supplier and inhibits competitive selection. In February 1980 the GAO suggested to the House Appropriations Committee several cost categories as being valid for consideration in equipment procurement strategy. In its report, the GAO asserted that "the purpose of competition is not to insure that all vendors face exactly the same odds in competing for government contracts. Rather, the purpose is to insure that the Government obtains its minimum requirements at the lowest cost."[15]

Thus, as technology evolves, it borders on the simplistic merely to insist on better enforcement of existing ground rules. The rules, when interpreted for particular circumstances, often are not all that clear.

The President's Reorganization Project developed the interesting and attractive notion of "earned autonomy," which is somewhat the converse of the devil agency theory. Under earned autonomy, agencies that demonstrate their desire and capacity to adhere to procurement procedures would be given additional authority in hardware and software procurement. For instance, the standard approval threshold requiring advance submission of procurement plans to the GSA might be waived for agencies with a good track record on competitive vendor selection.

Make new rules. If there are deficiencies or ambiguities in the array of ground rules now covering the management of federal data processing resources, it follows, in the view of many, that new rules should be enacted. The best current example of this bent toward increasing

15. U.S. General Accounting Office, *Conversion: A Costly, Disruptive Process That Must Be Considered When Buying Computers*, FGMSD-80-35 (GAO, June 3, 1980), p. 9. In revised procurement regulations published in the *Federal Register*, January 5, 1981, the GSA moved toward recognizing conversion and other costs as valid criteria in evaluating computer bids, instead of continuing to restrict the evaluation to the consideration of only equipment costs. The GSA now calls for consideration of "other factors" and requires a comprehensive "software conversion study" when the estimated purchase price of the equipment exceeds $2.5 million (p. 1207).

regulation is embodied in the Paperwork Reduction Act of 1980 (Public Law 96-511). This legislation, which originated in the House Government Operations Committee, was signed by President Carter on December 11, 1980, despite the last-ditch efforts of several major agencies, both military and civilian, to secure a presidential veto.

The law has a number of features that go beyond the laudable objective of strengthening the government's efforts at paperwork management. Certain provisions relate specifically to the management of automatic data processing resources by the OMB, GSA, and the user agencies. For example, the act calls for the creation of a "senior official" in each agency who will be responsible to the agency head and will be concerned not only with paperwork but with "information resources management," including computer processing. It further establishes an Office of Information and Regulatory Affairs within the OMB, to be concerned with government-wide information resources management.[16]

The Paperwork Reduction Act is by no means the only example of efforts to mandate new rules affecting information processing. Another can be found in the OMB's establishment of an Information Collection Budget. The idea here, as in most such initiatives, is an estimable one—to reduce the reporting demands levied by the government on individuals and businesses by requiring agencies to identify the costs of such data collection and justify these costs to the OMB through the mechanism of an information collection "budget" beyond the traditional budgetary justification process.[17]

The problem with making new rules, of course, is that they are usually superimposed over the existing framework of procedures and thus create a potential for increased complexity and frustration by placing additional accounting and reporting demands on already harried

16. Within one year after April 1, 1981, the effective date of the act, the OMB had to "establish standards and requirements for agency audits of all major information systems" and within two years had to (among other things) "develop a program to enforce federal information standards, particularly software language standards, at all federal installations." Also within two years, the OMB was called upon to "develop, in consultation with the Administrator of General Services, a five-year plan for meeting the automatic data processing and telecommunications needs of the federal government."

17. The OMB published the first Information Collection Budget covering fiscal year 1981 on January 13, 1981. Information collection budgeting supports one of the principal targets of the Paperwork Reduction Act: a 25 percent reduction in the public's reporting burden to the government over the next three years.

government data processing managers. Beyond this lurks the constant danger that the new rules may introduce not only untried but downright questionable practices. It is sometimes hard to discern in advance whether the cure may become more harmful than the disease with which the data processing community is already afflicted.

Create new organizations. Akin to the impulse toward new rule-making are proposals for the creation of new organization structures to help remedy data processing ills. This is a chronic temptation throughout the bureaucracy, and so it is not surprising that disruptive reorganizations have been a way of life in the area of federal information processing as elsewhere.

As noted earlier, the Paperwork Reduction Act calls for the creation of new organizational entities, not only in the OMB but also in every user agency. Another example can be found in the GSA's announcement of the establishment of a Federal Technology Management Center intended to assist agencies in developing "managerial and technical expertise in information technology," as well as an Office of Software Development. According to the GSA, the technology center idea is consistent with one of the recommendations of the President's Reorganization Project.[18]

Unless one has a built-in antipathy toward the creation of new government organization structures (and many people do), it would be unfair to condemn such efforts out of hand without carefully studying their rationale. There may indeed be requirements that can best be met by setting up new technical offices and centers. This is happening in private industry, where vice presidents of information systems proliferate these days, busily consolidating data processing with collateral functions such as telecommunications, office automation, libraries, and anything else that can be tagged an "information resource."

The obvious question here is the one that should be applied to new laws and regulations in any area: will these new organizations help or hinder? In the computer field there is a further question: should the functions assigned to these new entities be performed by the government at all? Perhaps the activities contemplated could better be supported by the software firms that abound on the Washington data processing scene.

18. Remarks by Frank J. Carr, commissioner of GSA's Automated Data and Telecommunications Service, before the Federal Automatic Data Processing Council of the Southeastern United States, July 31, 1980, p. 11.

Single issue advocacy. To round out the roster of those who advance cures for the afflictions of federal data processing, individuals and groups who can best be characterized as single-issue advocates should be mentioned. Like their counterparts in the broader realm of elective politics, they seize on one problem and press proposals for improvement that concentrate on this single issue.

As already noted, the House Government Operations Committee is concerned about procurement practices, and there are those who feel that if only the procurement process could be streamlined, most other data processing difficulties would be ameliorated. For example, by shortening the admittedly protracted procurement life cycle, the obsolescence factor in federal computer operations could be reduced. And money could be saved—probably a lot of it—by installing more modern and cost-effective gear.

Similarly, some people are preoccupied with the issues of privacy and security in government data systems to the virtual exclusion of other matters. Though almost everyone agrees that better safeguards are undoubtedly needed for personal data, some feel that this constitutes *the* paramount problem in government systems. Others are equally concerned with the potential for fraud, waste, and abuse in government accounting and payments systems and predict disasters of colossal magnitude if the security measures they espouse are not applied. It is often difficult to quarrel with the end result being pursued. But one must be skeptical about whether the federal data processing community would be better off if the single-issue advocates in such areas as procurement and security safeguards were to work their will.

THERE ARE DRAWBACKS—some serious, some minor—to most of the approaches espoused to date to achieve badly needed improvements in federal information systems management. Certain fundamental issues, which are outlined in the next section, must be considered if a genuine overhaul of federal computer operations is to be achieved.

Unique Aspects of Federal Systems

Invariably, comparisons between government computer operations and those in private industry are unfavorable to the former and carry the implication that if only government computer managers could be

more like their counterparts in industry, dramatic improvements in federal data processing would materialize. This is a specious premise.

Although many points of similarity undoubtedly exist between large-scale data processing done by the government and that done by major business firms, there are also essential differences. The magnitude of these differences makes emulation of private sector practices both unrealistic and undesirable.

The following principal characteristics of government data systems make these systems unique:

Size. The scope of federal computer operations, both in their totality and within particular agencies, provides a striking difference between government and industry. The overall figure of more than $5 billion annually for government computer work makes even the largest company's data processing budget minuscule by comparison. Even the individual budgets of relatively small agencies, such as the Department of Housing and Urban Development at about the $25 million level, outrank most Fortune 500 companies. A medium-sized agency like Agriculture, with annual data processing expenditures of around $150 million, is in the same class with industry giants like Rockwell and Shell. And the data processing budget of the Department of Defense, at over $2 billion, far surpasses the outlays of even the very largest firms like General Motors.

But size is not measurable in dollars alone. The transaction-processing operations of, say, the Internal Revenue Service, with 130 million taxpayer accounts, or that of the Social Security Administration, with 200 million accounts and 35 million payment recipients, far outrank the country's largest business data processing operations in volume.[19]

Complexity. With size comes complexity in federal information systems. There are more subsystems to design, more lines of code to write, and more interfaces to specify and test. Despite the breakthroughs in recent years in the throughput capability of new equipment, as well as more powerful software packages, computational problems in many

19. Of course, not all federal agencies have data processing requirements of the magnitude of those of the Internal Revenue Service or Social Security Administration. But in some respects the smaller agencies are worse off than their large-scale counterparts in that they must adhere to the same regulatory requirements but with smaller staffs and less expertise. A small agency that procures a computer system once every two or three years cannot, for example, afford the overhead of a staff of procurement and benchmarking specialists.

federal agencies continue to tax even the largest processors available today.

In accounting and transaction processing, the sheer number of file records and the volume of activity against those records engender processing complexity. For example, reruns due to malfunctions in hardware or programming errors can create such nightmarish scheduling problems that the computer time needed for rerunning may delay the completion of current processing in what could become a never-ending catch-up process. To avoid this, excess capacity must be provided for such contingencies, and this capacity becomes a subject for criticism by those who delight in discovering "idle" computer facilities.

Besides the complexities associated with massive data processing, built-in elements of complexity characterize much of the government's scientific computation. Long-range worldwide weather forecasting, for instance, is an inherently difficult exercise in modeling and computing, as is yield forecasting for agricultural production.

Private firms, of course, also rely on models for sales forecasting, financial planning, and the like. But in contrast to the computational problems confronting federal system development staffs, these processes are relatively common from company to company and hence are amenable to packaging and standardization.

Specialized applications. Though payroll accounting in the federal government is similar to payroll accounting in private industry, myriad applications in the government have no counterpart in private industry. Military command and control systems illustrate the uniqueness of government computer operations, as do the real-time mission support systems operated by the National Aeronautics and Space Agency. Specialized one-of-a-kind applications abound throughout the government, ranging from maintenance of the National Driver Register by the Department of Transportation to a meat-import information system in the Department of Agriculture.

Uniqueness in government data systems is significant in that it demands innovation in application development on the part of agency computer staffs. And innovation implies risks in terms of meeting design objectives and keeping projects on schedule.

In the late 1950s it was a difficult technological challenge to develop the first computerized bank check-processing system. Once the Bank of America proved the application feasible, however, it became relatively easy for other banks to follow suit. Similarly, when American

Airlines first automated the maintenance of passenger reservation records in the 1960s, other airlines were able to use American's system design concept and even portions of the programs in their own automation efforts. In this way technological know-how has been shared within various industries, and naturally equipment manufacturers eager to sell new gear within an industry promote such sharing.

Visibility. Federal information processing, like other government activities, is conducted in a goldfish bowl atmosphere in which expenditures, contract negotiations and awards, systems plans, and computer blunders all receive considerable, and frequently lurid, publicity. This is in marked contrast to the operations of most private firms, in which computer plans and budgets are not widely disseminated, and system-development fiascos are carefully shielded from public disclosure.

The visibility of government data systems is unavoidable and, on balance, may be beneficial. Competitive bid procedures require the publication of application plans and work load specifications. And review of agency computer practices by the executive branch central management agencies, the GAO, and various congressional committees is an unavoidable aspect of public administration.

Because they are in the public limelight, agency computer managers sometimes are treated unfairly by the press and by other critics. The attacks in the midseventies by privacy advocates on the GSA's unfortunate FEDNET project provide an example of ill-founded criticism of an attempt by that agency to carry out its charter under the Brooks Act of 1965 to promote government-wide sharing of computer resources. Congressional hearings on FEDNET and other large computer projects often seem oriented more toward highlighting flaws in system-design objectives than attempting to achieve improvements.[20] But for better or worse, high visibility of federal information systems is a fact of life,

20. See Robert V. Head, "Rise and Fall of FEDNET," *Journal of Systems Management*, vol. 26 (October 1975), pp. 6–13. FEDNET was a GSA initiative to achieve operating economies through the sharing of telecommunications network facilities by federal agencies. Initial users of the network were to have been the Department of Agriculture and the GSA itself. A *Washington Post* editorial, "A Fight Over Data Banks," on June 18, 1974, provided a good illustration of the phenomenon of single-issue advocacy in data processing and also indicated the power of Congress to scuttle worthwhile computer projects: "GSA spokesmen say, essentially, that privacy isn't their department—and they are right, in the sense that basic federal data-bank policies ought to be set up by the Congress. But this underscores the dangers of letting the system get so far ahead that an enormous nationwide network of this type can be on the verge of procurement before Congress even discovers it."

with little possibility of concealing or downplaying errors and misjudgments.

Managerial constraints. A variety of constraints and prohibitions—some logical and understandable, others difficult to defend—makes the job of managing federal data processing more difficult than the equivalent managerial task in private industry. Previously mentioned laws and regulations covering hardware and software acquisitions dictate the preparation of detailed specifications and benchmarks as a basis for securing competitive proposals. Not only does this prolong the acquisition process leading to contract award; more important, it diverts managerial and technical staff effort from the substantive task of agency mission support, a diversion that does not distract private sector managers.

But procurement is only the most obvious example of the unique milieu in which federal data processing managers have to function. Personnel regulations inhibit a manager from hiring technical staff members without going through the time-consuming procedures associated with competitive personnel selection and from terminating or disciplining employees whose performance is inadequate. A major problem of computer professionals in both government and industry is the struggle to keep up with rapidly changing technology; thus procedures that impede a manager from hiring and firing carry the risk of perpetuating personnel whose technical skills have atrophied.

As in the case of procurement practices, undoubtedly a valid rationale lies behind the government's approach to personnel management. It is not the purpose here to judge the desirability of such procedures but rather to note their relevance as factors that distinguish public systems management from that in the private sector.

Numerous other illustrations could be presented. The Privacy Act of 1974 and the Freedom of Information Act of 1974 apply only to federal agencies and impose special constraints on the collection, retention, and dissemination of information. Moreover, OMB Circular A-76, relating to public-private sector competition and the use of outside contractors, requires special justification for a "new start" computer installation when comparable services or facilities are available from commercial sources.[21]

21. U.S. Office of Management and Budget, *Policies for Acquiring Commercial or Industrial Products and Services Needed by the Government*, OMB Circular A-76

Top management and the systems manager. The management of federal systems is complicated by discontinuity and instability in the relationship between the systems manager and the top management of his agency. The most striking manifestation of this can be found in the transition from one administration to another, when the secretary of a department and all his deputies and assistants are abruptly replaced, usually with a new top management team pursuing policies at odds with those of the outgoing administration. This is virtually without parallel in a business firm.

But the problem is deeper than such dramatic surface manifestations. System-development life cycles frequently extend over several years and require careful long-range planning for their implementation. Yet the orientation of the top management of most agencies is toward achievements in the immediate future. Political appointees are especially aware of their brief tenure and the need to achieve mission objectives quickly. This fosters a managerial style that is not strategic in nature and that contrasts unfavorably with the kind of executive decisionmaking found in well-managed business firms.

What Are the Real Issues?

An understanding of the issues facing federal computer policy officials is vital if solutions that match real-world problems are to be formulated. As I stressed previously, many of the palliatives espoused in the past have proved ineffective in obtaining better managerial performance.

Balance of Planning and Control Authority

The Brooks Act of 1965 established the basic framework for the management of federal information systems. It gave three agencies—the OMB, GSA, and NBS—significant authority over government-wide computer activities: (1) OMB has an overall policy role; (2) GSA has

Revised, Transmittal Memorandum 4 (OMB, March 29, 1979). "A 'new start' will not be approved on the basis of economy unless it will result in savings compared to contract performance at least equal to 10 percent of Government personnel costs, plus 25 percent of the cost of ownership of equipment and facilities, for the period of the comparative analysis" (ibid., p. 9).

cognizance over procurement matters; and (3) NBS is charged with developing federal information processing standards.

Beyond the key roles given to these agencies, an oversight role is exercised by numerous congressional committees. Typically, an agency must justify its information processing initiatives to at least three committees in both the House and the Senate. The House Government Operations Committee and the Senate Governmental Affairs Committee are key bodies, as are the House and Senate Appropriations committees and the House and Senate committees having jurisdiction over the management of particular agencies, for example, Defense, Interior, and Justice. Depending on the concerns of individual committee members, these bodies often take a keen and detailed interest in computer problems.

Thus computer management in the federal government has a three-tiered control structure. The bottom level consists of the internal management structure and process within the agency itself. Above this is the regulatory and policy guidance of the central management agencies (OMB, GSA, and NBS). At the very top is the oversight of Congress.

The question is whether the present distribution of authority and responsibilities among these levels is the most suitable one. There is reason to believe that the balance of power has shifted too far away from the agency managers in the direction of unduly close supervision and scrutiny by higher levels of authority outside the agency, a practice that has been aptly characterized by the term "micromanagement." Consider, as an example, the informal practice that has grown up in recent years whereby GSA "clears" agency requests for procurement action with the staff of the House Government Operations Committee before acting on the agency request.

The legislative history of the Paperwork Reduction Act of 1980 indicates that this issue of the distribution of managerial authority is of genuine concern to user agencies. The central management agencies uniformly endorsed the legislation, which significantly affects computer planning as well as paperwork. But several user agencies, both military and civilian, opposed the act's computer provisions on the basis that they would unduly hamper agency computer management by further centralizing authority in the OMB.[22] And indeed, as noted, the act does

22. In a speech before a meeting of Department of Defense long-range planners on January 28, 1981, the sponsor of the act, Congressman Jack Brooks, asserted: "We